

Notes on Premium Foundation
Costs in Back Bay

BOSTON PUBLIC LIBRARY

Background

These notes summarize the results of an analysis made to establish the impact of foundation requirements peculiar to the Back Bay on the cost of buildings in this area. For the purpose of the analysis a residential type structure 100 feet square in plan was assumed. We have also assumed a conventional concrete frame type of structure with brick curtain walls and divided into bays which are 16'-8" square. Loadings compatible with the Boston Building Code have been used throughout.

We have examined structures of 3, 6, 10, 20 and 30 stories height using a common structural system. The costs which have been computed are only for those foundation related items which are in excess of the normal structure founded on spread footings. Specifically we have computed:

1. Cost of foundation units such as piles
2. Cost of pile caps where required.
3. Extra cost associated with the construction of self-supporting basement floors.

We have deducted the normal cost of footings or foundation mats for structures founded on soil capable of bearing 3 tons per square foot. Items common to all types of structures such as excavation and support of excavations during construction have not been considered.

The study area has been subdivided into the 5 sub-areas shown on the attached plans; this division has been made on the basis of soil conditions and the different foundations which are appropriate to those conditions for the various sizes of structures being considered. The major distinction is between those structures of approximately 10 stories or less which may be founded on relatively shallow foundation units and those greater than 10 stories which must be founded on deep foundation units. The division at 10 stories is somewhat arbitrary; this is usually the upper limit for buildings founded on shallow units in the Back Bay but in some special cases it may be possible to exceed this depending on the type of structure and the particular soil conditions at the site. Floating foundations have not been considered because the practical application of this technique is also related to special circumstances.

The results of the analysis are shown on the attached graph. The figures shown are for the most part self-explanatory. It should be borne in mind, however, that for particular soil conditions and by manipulation of the structural system it is possible that these figures may vary 20 percent either up or down. It is believed that the figures are approximately applicable to office buildings in which case the heavier loads may increase costs slightly and to garage structures in which case they may be reduced slightly.

For deep foundations there are a number of factors which may cause the figures shown to vary widely. The first is the depth to rock; we have arbitrarily divided the Back Bay area into two sub-areas where the depth of rock is defined as being from 100 to 200 feet. In fact the surface of rock varies in some fashion from a depth of perhaps 80 feet to over 200 feet in the area. There is unfortunately not sufficient data available to determine precisely how it varies.

Another factor which has a large impact on cost of deep piles is the amount of space which is available to the pile driving operations. For the approximately 100 foot square site which we have assumed this is not too serious for piles of 100 foot length or less. However, for piles which must be greater than 100 feet in length the operations are much more difficult and this is reflected in the wider price spread shown on the graph. For the sites in the area between Beacon Street and Boylston Street it would probably be most realistic to assume a restricted site.

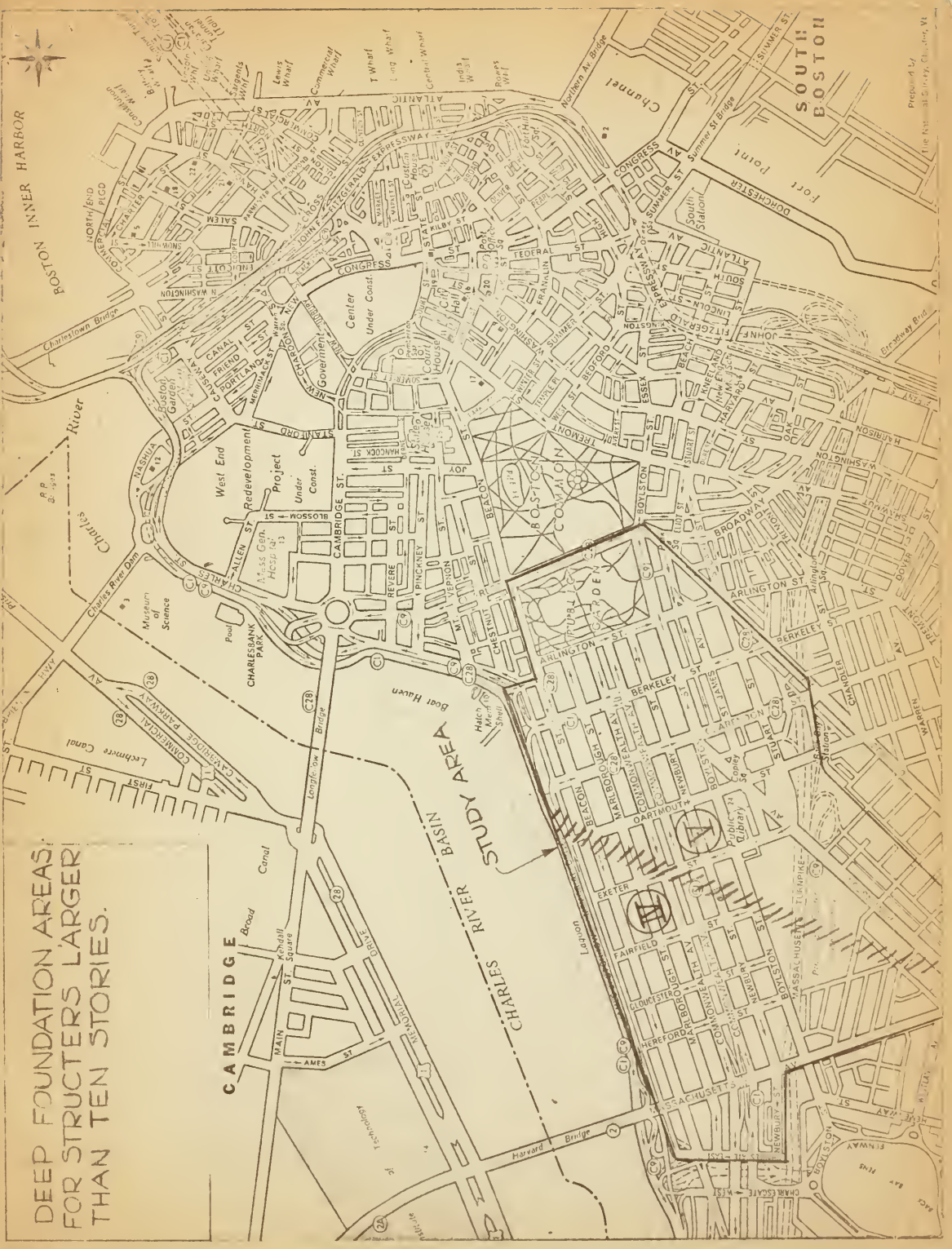
A further note of caution regards the boundaries shown for shallow foundation areas. These are based on our best knowledge of the soil conditions and actual experience. However, these boundaries should not be considered as definite lines but more as transition areas. Also, the costs shown for Area II can vary probably between the extremes indicated for deep foundations and those for Areas I and III; this is an area of great uncertainty, particularly for those structures approaching the upper limit of 10 stories.

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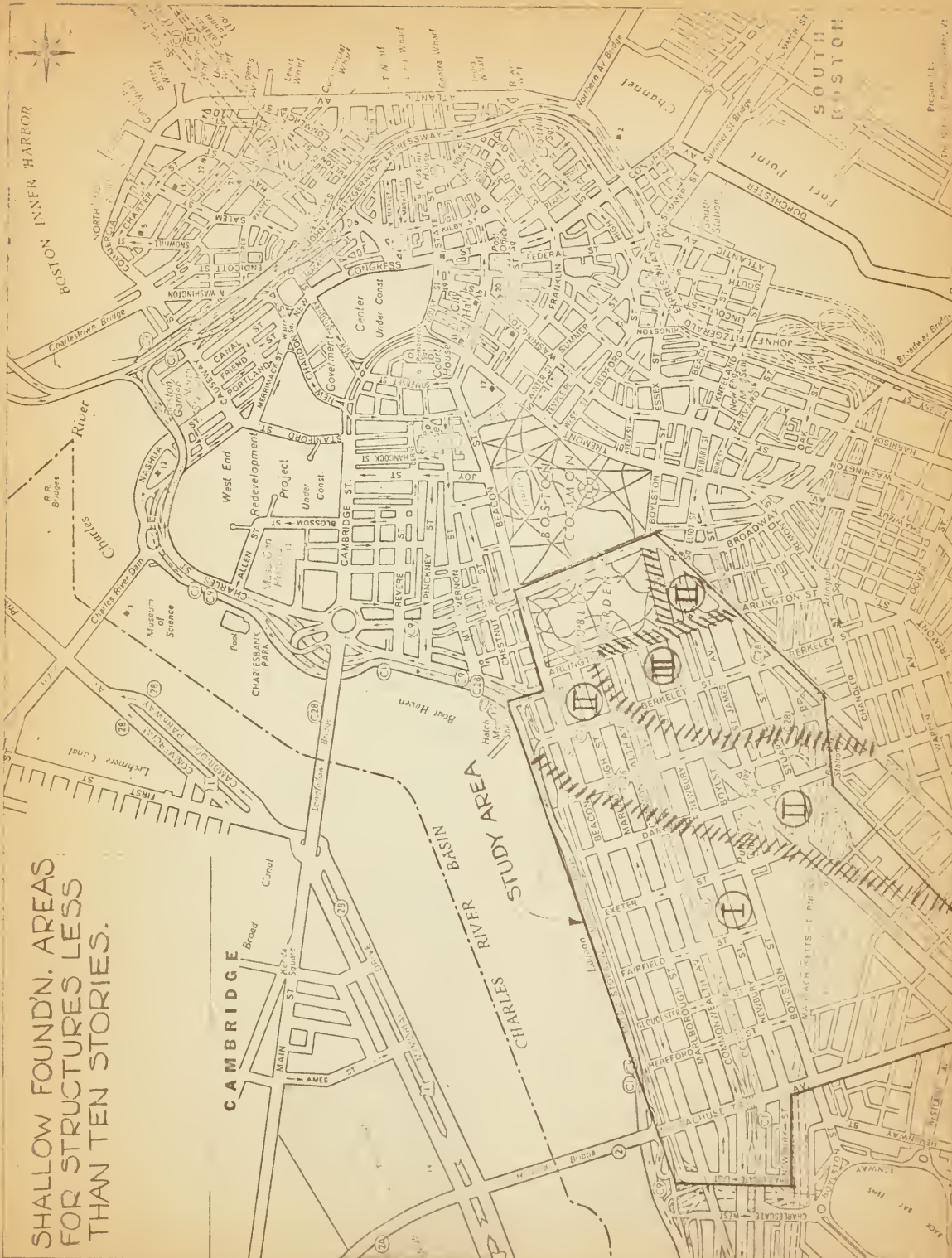
DEEP FOUNDATION AREAS
FOR STRUCTURES LARGER
THAN TEN STORIES.

CAMBRIDGE

STUDY AREA
CHARLES RIVER BASIN



SHALLOW FOUND'N. AREAS
FOR STRUCTURES LESS
THAN TEN STORIES.

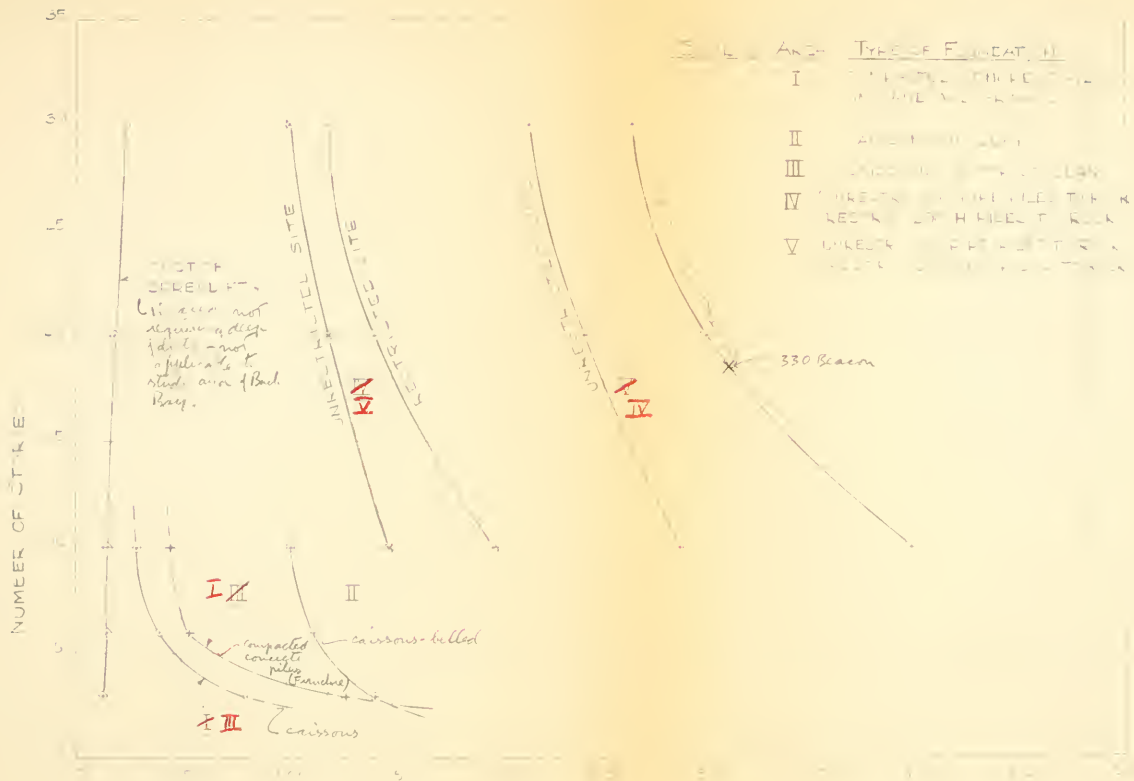




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SUMMARY OF PREMIUM FOUNDATION COSTS IN BACK BAY



RATIO OF PREMIUM FOUNDATION COST TO GROSS FLOOR AREA, %/SQ FT

